

W/O 2004/032123 PCT/IB2003/004006  
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CLAIMS:

1. A MO-ROM medium with small track width, wherein
  - data is recorded at least on one side of a disk;
  - a data side has on a substrate at least a recording layer wherein said data is recorded and at least a read-out layer to reproduce said data recorded in said recording layer
- 5 during read-out;
  - said recorded data is arranged within adjacent data tracks on said disk; and
  - a recording density within a data track is beyond the diffraction limited density ( $2 N.A./\lambda$ ) of the focussing optics,
- characterized in that
- 10
  - said data tracks are arranged in groups of several adjacent data tracks;
  - said track width within said data track groups is smaller than at least the diffraction limit ( $\lambda/2 N.A.$ ) of the focussing optics; and
  - reference means for tracking a selected data track group with said read-out laser beam are provided for each data track group.
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2. A MO-ROM medium according to claim 1, wherein said disk contains at least one data track group having a spiral form running concentric with an increasing radius from center of said disk to the outer edge of the disk.
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3. A MO-ROM medium according to claim 1 or 2, wherein said disk contains a plurality of data track groups being concentric circles with increasing radii from center of the disk to the outer edge of the disk.
4. A MO-ROM medium according to one of the claims 1 to 3, wherein said
- 25 reference means are provided by local reference means between adjacent data track groups.
5. A MO-ROM medium according to claim 4, wherein said local reference means are lands and/or grooves within the substrate of said MO-ROM.

6. A MO-ROM medium according to claim 4 or 5, wherein said local reference means are provided by a transition between a land and a groove within said substrate of said disk and each land and each groove contain one of said data track groups.
- 5 7. A MO-ROM medium according to claim 6, wherein a width of said lands and a width of said grooves are equal.
8. A MO-ROM medium according to one of the claims 1 to 7, wherein each of said data track groups contains an odd number of data tracks.
- 10 9. A MO-ROM medium according to one of the claims 4 to 8, wherein a specific data track of a data track group is selected for read-out by an offset value added to a push-pull error signal generated with reference to a center data track of said data track group and said local reference means.
- 15 10. A MO-ROM medium according to claim 9, wherein data is recorded only in said center track of each of said data track groups.
11. A MO-ROM medium according to claim 10, wherein at least one of the other  
20 data tracks of at least one of said data track groups contains additional information, wherein said additional information provides for e.g. copy limitation, conditional access or digital rights management.
12. A MO-ROM medium according to one of the preceding claims, wherein time  
25 reference means are provided within each data track group.
13. A MO-ROM medium according to claim 12, wherein said time reference means are embossed regions on said substrate within each of said data track groups.
- 30 14. A MO-ROM medium according to claim 13, wherein said embossed regions intermit each of said data track group into data track group sections.
15. A MO-ROM medium according to one of the claims 13 or 14, wherein a specific data track of a data track group is selected by setting a offset value during read-out of

an embossed region using the differential time detection (DTD) method, while tracking control is kept fixed between two embossed regions.

16. A MO-ROM medium according to one of the claims 12 to 15, wherein said  
5 disk has a flat substrate and said data track groups are equally spaced.

17. A MO-ROM medium according to one of the preceding claims, wherein for read-out a Super Resolution technique is used like MSR, MAMMOS or DWDD.

10 18. A MO-ROM medium according to one of the preceding claims, wherein said disk is produced by injection molding or by photopolymer replication.

19. A MO-ROM medium according to claim 18, wherein the information pattern is defined in the injection molding master or the replication layer by a high-resolution  
15 lithography technique, like an electron-beam writer.

20. A method for read-out of a small track width MO-ROM with data recorded in an adjacent data tracks wherein a data track has a recording density beyond the diffraction limited density ( $2 N.A. / \lambda$ ) of the focussing optics and a predetermined number of adjacent  
20 data tracks are arranged in data track groups in which track width is smaller than at least the diffraction limit  $\lambda / 2 N.A.$  of the focussing optics and reference means are provided for each data track group for tracking a selected data track with the read-out laser beam, comprising the steps:

- identifying said reference means on said MO-ROM medium to be read-out;
  - 25 - selecting a specific data track group on said MO-ROM medium for read-out;
- and
- setting an offset value according to said reference means to tracking means for keeping said read-out laser beam tracked on a specific data track within said selected data track group to be read-out.

30 21. A method for read-out of a MO-ROM with small track width according to claim 20, wherein said reference means are local reference means between adjacent data track groups.

22. A method for read-out of a MO-ROM with small track width according to claim 20 or 21, wherein during read-out of a data track conventional push-pull tracking is used.

5 23. A method for read-out of a MO-ROM with small track width according to claim 20, wherein said reference means are embossed time reference means within each data track group intermitting each data track into data track group sections.

24. A method for read-out of a MO-ROM with small track width according to  
10 claim 23, wherein during read-out for tracking a selected data track group the differential time detection method is used with respect to said embossed time reference means.

25. A method for read-out of a MO-ROM with small track width according to one of the claims 20 to 24, wherein said tracking means are a radial tracking electronics for  
15 keeping said read-out laser-beam on a specific data track to be read-out and said set offset value is a tracking offset to adjust said tracking electronics.

26. An apparatus for read-out of a small track width MO-ROM medium with at least a recording layer for recorded data and a read-out layer to reproduce said recorded data  
20 in said recording layer on a substrate, wherein data is recorded at least on one data side of a disk within adjacent data tracks wherein first a recording density within a data track is beyond the diffraction limited density ( $2 N.A. / \lambda$ ) of the focussing optics and second said data tracks are arranged in groups of several adjacent data tracks with an individual track width of at least less than the diffraction limit  $\lambda / 2 N.A.$  of the focussing optics and local  
25 and/or time reference means for keeping said read-out laser beam tracked on a selected data track group are provided for each data track group comprising:

- a read-out unit for read-out of said data recorded in said recording layer of said small track width MO-ROM medium at said small track width and at said recording density beyond the diffraction limited density ( $2 N.A. / \lambda$ ) of the focussing optics;
- 30 - a tracking unit for keeping said read-out laser-beam tracked on a selected data track group containing a specific data track to be read-out; and
- a control unit for supplying an offset value to said tracking unit corresponding to a data track to be read-out according to said local and/or time reference means provided by said MO-ROM.

27. An apparatus according to claim 26, wherein said control unit adds a offset value to a tracking error signal derived from local reference means arranged between adjacent data track groups.

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28. An apparatus according to claim 26, wherein said control unit sets a offset value to a tracking error signal derived from time reference means arranged within each data track group intermitting each data track group in data group sections.

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